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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/806,756	05/03/2001	Stephane Lubiarz	MATR-0018-US	4915

7590 06/07/2005

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EXAMINER

LERNER, MARTIN

ART UNIT

PAPER NUMBER

2654

DATE MAILED: 06/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/806,756	Applicant(s) LUBIARZ ET AL.	
	Examiner Martin Lerner	Art Unit 2654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 to 13 and 16 to 38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 to 4, 11 to 13, 16 to 18, 25 to 30, and 37 to 38 is/are rejected.
- 7) ☒ Claim(s) 5 to 10, 19 to 24, and 31 to 36 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1 to 4, 11, 13, 16 to 18, 25, 27 to 30, and 37 are rejected under 35 U.S.C. 102(a) as being anticipated by *Lockwood et al. (WO '737)*.

Note: The inventive entities are not identical, so 35 U.S.C. 102(a) applies as an invention “by others”. *Lockwood et al. (WO '737)* is relied upon for the rejection. However, for purposes of convenience, citations to columns and line numbers are with respect to *Lockwood et al. ('380)*, which is a certified translation of *Lockwood et al. (WO '737)* in English. *Lockwood et al. ('380)* claims priority with respect to *Lockwood et al. (WO '737)*.

Regarding independent claims 1, 13, and 27, *Lockwood et al. (WO '737)* discloses a method, device, and computer program product for detecting speech activity, wherein;

“the voice activity is detected on the basis of an analysis comprising the step of comparing two different versions of the speech signal, wherein at least one of said versions is a denoised version obtained by taking account of estimates of noise

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included in the signal" – speech detection states are determined on the basis of the difference $ba_i - bi_i$; ba_i and bi_i are "two different versions of the speech signal" because they are derived from the quantities $\Delta E_{n,i}$ and $E_{n,i}(\text{bar})$; in turn, $\Delta E_{n,i}$ and $E_{n,i}(\text{bar})$ are both derived from $E_{n,i}$, which is the energy of the noise-suppressed signal for each of the energy bands for band subscript i and for frame subscript n ; thus, both $\Delta E_{n,i}$ and $E_{n,i}(\text{bar})$, and it follows, ba_i and bi_i , are denoised versions of the speech signal; the subtraction quantity $ba_i - bi_i$ is a difference, which involves "comparing two different versions of the speech signal"; $\Delta E_{n,i}$ and $E_{n,i}(\text{bar})$ are derived from $E_{n,i}$'s, and $E_{n,i} = E_{p_{n,i}}^2(\text{hat})$, where $E_{p_{n,i}}(\text{hat})$ is "a denoised version obtained by taking account of estimate of noise included in the signal" by Equation (3), as $E_{p_{n,i}}(\text{hat})$ subtracts noise estimates $B_{n-1,i}(\text{hat})$ (column 3, line 4 to column 4, line 12: Figures 1 to 4).

Regarding claims 2, 16, and 28, *Lockwood et al. (WO '737)* discloses speech detection states are determined on the basis of the difference $ba_i - bi_i$; ba_i and bi_i are respective energies, evaluated in at least one frequency band, because ba_i and bi_i are based upon energy $E_{n,i}$'s, and energies $\Delta E_{n,i}$ and $E_{n,i}(\text{bar})$, where energy $E_{n,i}$ equals magnitude spectral component $E_{p_{n,i}}^2(\text{hat})$; subscript i denotes each frequency band of the quantities ba_i and bi_i (column 3, lines 16 to 22; column 3, line 45 to column 4, line 12: Figures 1 to 4).

Regarding claims 3, 17, and 29, *Lockwood et al. (WO '737)* discloses $E_{n,i}(\text{bar})$ is a smoothed long-term energy computed using a forgetting factor B1 (column 3, lines 33 to 36: Figure 2: Step 33); ba_i is set equal to smoothed value $E_{n,i}(\text{bar})$ at certain points in time (column 3, lines 45 to 53: Figure 3: Step 28); bi_i is also a function of $E_{n,i}(\text{bar})$ by

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Equation (4) (column 3, lines 53 to 65: Figure 3: Step 33); thus, the comparison of taking the difference $ba_i - bi_i$ involves "a comparison between the energy of said smoothed version and the smooth energy."

Regarding claims 4, 18, and 30, *Lockwood et al. (WO '737)* discloses an automaton for transitioning between states of speech activity (column 4, lines 13 to 35: Figure 4); transition between states is based upon comparison of $ba_i - bi_i$ to threshold ϵ_2 to obtain p_i , where p_i determines a state δ_n , by comparison of p_i to thresholds SE1 to SE4; state $\delta = 0$ corresponds to a silence state and state $\delta = 2$ corresponds to a speech state (column 3, line 65 to column 4, line 35: Figures 3 and 4).

Regarding claims 11, 25, and 37, *Lockwood et al. (WO '737)* discloses ba_i and bi_i are based upon energy $E_{n,i}$'s, and energies $\Delta E_{n,i}$ and $E_{n,i}$ (bar), where energy $E_{n,i}$ equals magnitude spectral component $E_{p_{n,i}}^2$ (hat); subscript i denotes each frequency band of the quantities ba_i and bi_i ; the difference $ba_i - bi_i$ is compared to threshold ϵ_2 , which is "a lower bound of the energy" (column 3, lines 16 to 22; column 3, line 45 to column 4, line 12: Figures 1 to 4).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 12, 26, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Lockwood et al.* (WO '737) in view of *Ertem et al.*

Lockwood et al. (WO '737) does not disclose that one of the two different versions of the speech signal is a non-denoised version of the speech signal, as both ba_i and bi_i are derived from energy $E_{n,i}$ and spectral components $Ep_{n,i}$ (hat), where $Ep_{n,i}$ (hat) is a denoised version of the speech signal. (Column 3, Lines 4 to 23: Figure 2) However, *Ertem et al.* teaches a related method of noise reduction for speech, where a VAD decision, or speech activity decision, is based upon a comparison of signal energy 46 to a VAD threshold 44, by Equation (1). (Column 2, Lines 2 to 12: Figures 4, 5, and 10) Signal energy is a non-denoised version of the speech signal. The speech energy is calculated by an adaptively filtered version 46, which reduces the noise content of the input signal so that a more accurate energy value can be used in the VAD decision 42. (Column 5, Lines 20 to 27: Figures 4, 5, and 10) However, threshold adaptation 44 is not directly based upon an adaptively filtered energy computation, but depends upon many signal variables. (Column 5, Lines 27 to 42: Figures 4, 5, and 10). *Ertem et al.* suggests a method of noise reduction that overcomes a number of disadvantages including reduced intelligibility, listener fatigue, and degraded compression, so that voice activity detection is reliable and robust. (Column 1, Lines 45 to 65) It would have been obvious to one having ordinary skill in the art to provide a speech activity detection method that compares a denoised version of a speech signal with an non-denoised version of a speech signal as suggested by *Ertem et al.* in the method for detecting

speech activity of *Lockwood et al.* (WO '737) for the purpose of making it more reliable and robust.

Allowable Subject Matter

5. Claims 5 to 10, 19 to 24, and 31 to 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

6. Applicants' arguments filed 01 March 2005 have been fully considered but they are not persuasive.

Applicants argue that *Lockwood et al.* (WO '737) does not anticipate independent claims 1, 13, and 27 because ba_i and bi_i cannot be "two different versions of the speech signal". Applicants say ba_i is a long-term noise envelope estimator and bi_i is an internal noise estimator. Applicants state that a noise estimator, even if estimated partly from the speech signal, cannot be considered as a version of a speech signal. Thus, Applicants maintain that the difference $ba_i - bi_i$ cannot be assimilated to the comparison of two different versions of the speech signal, as set forth by independent claims 1, 13, and 27. Further, Applicants submit that even if it were admitted that ba_i and bi_i could be two different versions of the speech signal, neither ba_i nor bi_i is a denoised version of the speech signal, as both are noise estimates of the speech signal. This position is not persuasive.

It is maintained that anything derived from a speech signal could be considered "a version" of the speech signal. More generally, any speech signal contains periods of speech and periods of silence or background noise. It is conventional in the prior art of voice activity detection to consider both periods of speech and periods of background noise to obtain an estimate of voice activity. Thus, particularly for voice activity detection, periods of silence or background noise are understood to be broadly included in a definition of what is considered as a speech signal. Moreover, saying that something is "a version" of a speech signal is certainly broader than saying that something is a speech signal *per se*. Neither Applicants' Specification nor any common understanding of the prior art provides a definition of scope to be accorded to "a version" of a speech signal. If a scope of "a version" is not precisely defined, then "a version" should be broadly construed.

During patent examination, the pending claims must be "given their broadest reasonable interpretation consistent with the specification." *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000). Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969) "A version" of a speech signal for purposes of voice activity detection should be broadly construed to include speech during periods of relative silence in consonance with principles of broadest reasonable interpretation. Indeed, VAD's typically operate by estimating background noise from a speech signal during periods of relative silence to

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obtain a baseline of what amplitudes are to be considered speech and what amplitudes are to be considered non-speech.

At least ba_i "is a denoised version obtained by taking into account estimates of noise included in the signal." *Lockwood et al. (WO '737)* discloses that ba_i is set to be equal to value $E_{n,i}(\text{bar})$. (Column 3, Lines 49 to 52: Figure 3: Step 28) The quantity $E_{n,i}(\text{bar})$ is the long term energy of the noise-suppressed signal in band i . (Column 3, Lines 26 to 27) Thus, $E_{n,i}(\text{bar})$ is not simply "a long-term noise envelope estimator". When $ba_i \geq E_{n,i}(\text{bar})$, then ba_i is set equal to $E_{n,i}(\text{bar})$. What ba_i represents is taking the outer envelope of a noise-suppressed speech signal $E_{n,i}(\text{bar})$ whenever $ba_i \geq E_{n,i}(\text{bar})$. Although ba_i is referred to as a long-term estimator of a noise envelope, it is, in fact, a smoothed version of a noise-suppressed speech signal $E_{n,i}(\text{bar})$.

In contrast, bi_i is derived from $E_{n,i}(\text{bar})$ and ba_i , taking a value close to ba_i during a speech state (when B_m is close to 1), and a value closer to $E_{n,i}(\text{bar})$ during a silence phase (when B_m is given a lower value). (Column 3, Line 53 to Column 4, Line 5: Figure 3: Step 33) Thus, bi_i is also a quantity that is broadly "a version of the speech signal" because it is derived from the long term energy of the noise-suppressed signal $E_{n,i}(\text{bar})$ during a silence phase and from a long-term envelope estimator ba_i during a speech state. It is true that bi_i is called an internal noise estimator, but bi_i is still "a version of the speech signal" because it is derived from a varying speech signal during both a silence phase and a speech state.

It is not agreed that ba_i and bi_i are both simply "noise estimates of this speech signal", as contended by Applicants. While ba_i and bi_i are estimated, in part, from

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periods of silence or background noise, they are also estimated from a noise-suppressed signal during speech states. The definitions of ba_i and bi_i are complex, but they are not merely noise estimates. At least in part, ba_i and bi_i are derived from the speech signal during a speech state, so that they could be considered by one having ordinary skill in the art as "two different versions of said speech signal".

It is noted that Applicants' Specification discloses quantities similar to *Lockwood et al.* (WO '737) for "comparing two different versions of the speech signal". The Specification, Page 11, Line 31 to Page 12, Line 4, discloses comparing differences between energies $E_{1,n,j}$ and $E_{2,n,j}$, and a lower bound of energy $E_{2,n,j}$. The Specification, Page 12, Lines 5 to 32, discloses that the calculation of lower bound of energy $E_{2,n,j}$, called $E_{2min,j}$, is complex, but $E_{2min,j}$ is still referred to as "a version of the speech signal".

Applicants are unwarrantedly attempting to read limitations into the claims for what constitutes a version of a speech signal from the Specification. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The claims, on their face, as broadly construed, do not distinguish over *Lockwood et al.* (WO '737).

Therefore, the rejections of claims 1 to 4, 11, 13, 16 to 18, 25, 27 to 30, and 37 under 35 U.S.C. 102(a) as being anticipated by *Lockwood et al.* (WO '737), and of claims 12, 26, and 38 under 35 U.S.C. 103(a) as being unpatentable over *Lockwood et al.* (WO '737) in view of *Ertem et al.*, are proper.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicants are reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin Lerner whose telephone number is (571) 272-7608. The examiner can normally be reached on 8:30 AM to 6:00 PM Monday to Thursday.

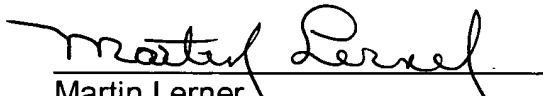
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571) 272-7602. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ML

6/1/05


Martin Lerner
Examiner
Group Art Unit 2654